# NORTHERN GILA COUNTY WATER PLAN

**Technical Committee Report**
**And**
**Recommendations to the**
**Steering Committee**

**23 February 1998**

## ACKNOWLEDGEMENTS

This report was developed and finalized utilizing input from dozens of sources over a very short period of time. These sources included: Private Residents from the Payson-Pine-Strawberry Area, Local and Statewide Water Companies, Local Improvement Districts, Town, Tribal, County, State and Federal Governments.

The Northern Gila County Water Plan Technical Committee would like to specifically recognize the following organizations and individuals for their input and efforts in developing this report. Names appear in no particular order.

**Northern Gila County Water Plan Steering Committee**

Ronald L. Christensen (Gila County) - Chairman

**NGCWP Technical Committee**

Robert J. Mawson (Gila County) - Chairman

Dennis Sundie (ADWR) – Water Demand Sub-Committee Chair

Mark Anderson (USGS) – Water Sources Sub-Committee Chair

John Hathaway (ADEQ) – Environmental & Conservation Sub-Committee Chair

Reed Petersen (USDA-Rural Development) – Funding Sources Sub-Committee Chair

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## INTRODUCTION

The Northern Gila County Water Plan effort was organized following a meeting of the Payson-Pine-Strawberry Study Group on September 19, 1997. The meeting was held at the R-C Scout Camp Northeast of Payson and was attended by approximately fifty (50) representatives from the Public, Town of Payson, Tonto Apache Tribe, Gila County, State of Arizona, Local Water Companies and Improvement Districts, and several Local, State, and Federal Agencies.

Presentations were made, and discussions held, concerning the historic and continuing water problems facing Northern Gila County. During the meeting it became evident that the need for a firm water supply in Northern Gila County was long overdue. A Steering Committee was formed to coordinate the effort and volunteers were enlisted for participation in a Multi-Agency Technical Committee.

The NGCWP Steering Committee, chaired by Gila County Supervisor Ron Christensen, held their first meeting on October 30, 1997 (see minutes in Appendix B). During the October meeting, representatives from many of the entities referenced above, discussed the roles and structure of the Steering Committee in developing a Water Plan.

A Technical Committee, chaired by Gila County Development & Planning Director Robert Mawson, was appointed and given the responsibility of generating a report that would provide the following information: Current and Future Water Demand Projections, Potential Surface and Ground Water Sources, Environmental and Conservation Concerns, Potential Funding Sources and Recommendations to the Steering Committee for Proceeding with the effort to establish a firm water supply.

This Report has been created in an effort to fulfill this responsibility.

# STATEMENT OF PURPOSE
# PROCESS
# AND INTENDED USE

## PURPOSE

The purpose of the Northern Gila County Technical Committee Report is to provide a Preliminary Study of the Northern Gila County Water Issue and Assist the Community, County, State and Federal decision-makers in pursuing solutions.

## PROCESS

The process of developing this document involved:

1. Documenting existing resources known to the Technical Committee membership.
2. Sharing "known" information through a series of coordination meetings.
3. Utilizing a Sub-Committee approach to address the many issues involved in approaching this kind of project.
4. Consolidating the Sub-Committee information into a single source of information for the use of all participating parties.

## INTENDED USES

It is the intention of the Technical Committee that this Report will enable the members of the NGCWP Steering Committee to work directly with Private, State, and Federal Agencies and Funding Sources to coordinate the following:

1. Secure funding for a Comprehensive Water Plan for the Northern Gila County area.
2. Research and Exploration to identify and secure firm sources of water.
3. Construct the Necessary Infrastructure to Transport, Store and Deliver the Water to the Users.

# EXECUTIVE SUMMARY

Gila County is situated near the center of the State of Arizona and enjoys a rich history of customs and cultures. Native American inhabitants settled the area during prehistoric times and many of their descendents continue to live here today. Successive generations of settlers have established strong traditions of mining, ranching, logging, and recreational activities. Because the ratio of private to public land in Gila County is so low (3.5 percent private land) rural lifestyles, quality of life issues, economic, and recreational opportunities enjoyed by Gila County residents and visitors, have been, and continue to be dependent upon access to public lands and natural resources.

The Northern Gila County area, which includes Payson, Pine, Strawberry and Star Valley, has experienced an increase in year-round and seasonal population over the past several years. In addition, some estimates indicate that recreational use of the area, particularly by non-county residents, continues to produce numbers that double the population during certain periods of the summer months. The growing year-round population and expanding recreational impacts have contributed to frequent water shortages in the study area.

Current water usage in the area is estimated to be less than 2000 acre-feet per year, given actual usage records where available. This usage is probably low, however, considering the water shortages and conservation efforts that have been on going for several years. The majority of residents in the area take great care in utilizing this precious resource.

The study area's primary source of water is groundwater drawn from public and private wells. Overdraft of ground water in the Payson area has produced declining water levels in the Town's network of supply wells. Water quality, in some wells, has also had an impact. In the Pine/Strawberry area, a lack of high producing water wells and under-developed infrastructure combine to create frequent inadequate or unavailable water supply for residents. Recreational use by tourists and seasonal visitors also severely impact the study area's water supplies.

Population projections, developed for this report, indicate between 38,000 and 48,000 residents by the year 2050. Serving this population will require an additional 4,500 to 5,500 acre-feet of water (based on 150 gallons per day, per capita). With adequate storage capability these quantities should be able to serve the recreational users as well.

Although various lakes, watersheds, aquifers, riparian and other aquatic areas are among Gila County's natural resources, many of these water sources are not available to serve County residents. Instead they are utilized to serve populations outside the county boundary, primarily those in the greater Phoenix area.

Several potential water sources were discussed as possible solutions to future water needs. (Section 3 of this report lists many possible sources). Among the most discussed were Blue Ridge Reservoir, new water wells, greater and more effective use of reclaimed water and miscellaneous area water rights. Additional hydrogeologic, legal and cost/benefit information will be required before final informed decisions can be made.

Ongoing efforts by the Arizona Department of Water Resources to explore Blue Ridge Reservoir water rights, and groundwater identification efforts by the USGS and others, may result in some sources becoming available sooner than others. Nevertheless, any chosen course of action will likely involve environmental and conservation issues (discussed in Section 4 of this report). Lawsuits from concerned third parties may also impact final decisions.

Recommendations for the Steering Committee to consider for continuing this process include:

1. Seek funding for, and commission the development of, a Comprehensive Water Plan to identify and establish a firm water supply for the Northern Gila County Area. Potential funding sources include the Governor's office, the Arizona Legislature and various Local, State and Federal Agencies (section 5 of this report discusses some options)

2. Schedule a presentation for the Rural Infrastructure Meeting, which is being hosted by CAAG on March 18, 1998.
3. Continue to participate in and monitor the Blue Ridge Reservoir negotiations. These talks may result in several thousand acre-feet of water becoming available in the near future.
4. Pursue a Memorandum of Understanding with the USGS for the use of their drill rig in March/April 1998. A deep well drilled in the Pine/Strawberry area could determine the saturation level of the Redwall Limestone Formation that lies beneath. This exploration may reveal a sufficient ground water source for the Pine/Strawberry area. The USGS drill rig is scheduled to be in the Williams area in March 1998. Cost for this project is estimated at thirty to fifty thousand ($30,000 – $50,000) dollars.

A Comprehensive Water Plan for Northern Gila County should address the following information needs:

1. Develop a rationale for the inventory of possible sources (listed in section 3) either excluding them or recommending them for further development. Additional source opportunities may also be identified during this process.
2. The resource, legal and institutional constraints that limit the development of surface water from Tonto Creek and/or East Fork of the Verde River must be determined. The feasibility of harvesting higher surface flows from these two sources should also be determined.
3. Regional Acquifer characteristics on the Colorado Plateau, near the Mogollon Rim, need to be determined. This could be a stable source of water for the area if well yields and aquifer storage capacities are sufficient for sustained pumping.
4. Infrastructure costs associated with pipeline construction, operation and maintenance; costs associated with storage reservoirs and water treatment plant construction, operation and maintenance also need to be explored.

# SECTION ONE

## Study Area Description

# STUDY AREA

## 1.0 Boundary Description

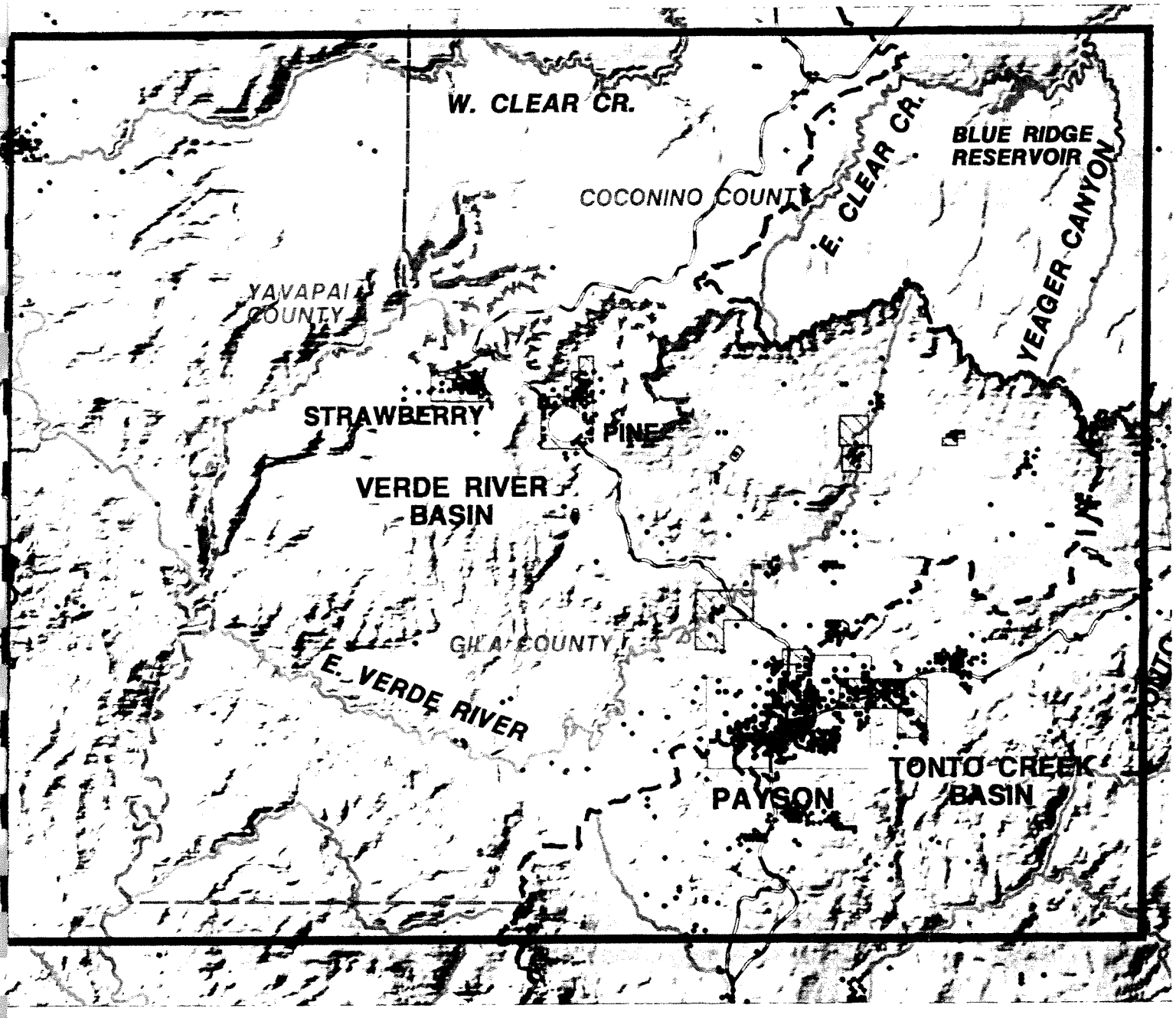
The Northern Gila County Water Plan Technical Committee was assigned the task of determining the appropriate area for this study. Figure 1(A) delineates the suggested Study Area and notes significant water source information.

It should be noted that the recommended Study Area includes portions of Yavapai and Coconino Counties. In establishing this Study Area much discussion was had concerning the area of water demand and the area of potential sources. This Study Area seeks to address both issues by not only encompassing the population/demand centers but also some of the potential water sources above the Mogollon Rim.

It should also be noted that solutions to the water demand requirements may come from sources outside the Study Area. For example, Central Arizona Project water allocations may be utilized to negotiate alternate water sources.

It was the general consensus of the Technical Committee that when looking for possible solutions we must investigate all reasonable possibilities.

# NORTHERN GILA COUNTY WATER PLAN



# SECTION TWO

## Water Demand Analysis

# WATER DEMAND ANALYSIS

## 2.0 PURPOSE

The purpose of this analysis is to estimate the total water demand in Northern Gila County beginning in the year 2000 and ending in the year 2050.

## 2.1 METHODOLOGY

Water demands are based on two growth scenarios. The first scenario represents Population Technical Advisory Committee recommended and Department of Economic Security approved resident population projections, for the study area. The second scenario incorporates the town of Payson's Alternate "B" Land Use Plan that results in a build out population of 36,202 persons. Additional population was added to the Pine-Strawberry area to reflect a build-out water demand in that area.

Northern Gila County experiences unusually high peak demands at certain times in the summer months. These events appear to coincide with long holiday weekends and can result in two to five day peak demands that exceed local peak demands normally experienced in the summer months. In order to allow for normal peak summer demands and the occasional short-term peak demands, a resident water use rate of 150 Gallons Per Calendar Day (GPCD) was used to calculated annual water demand in the study area.

For purposes of this report, the study area would experience maximum growth in the year 2050.

## 2.2 Growth Scenario 1

Based on population projections from the Department of Economic Security, resident population in the study area will increase from 20,619 persons in the year 2000 to 38,744 persons in the year 2050.

The Department of Economic Security projects that the population of the Town of Payson will more than double in this time frame and by 2050 seventy-six percent of the people living in the study area will reside in Payson. (29,444 persons)

The unincorporated areas of Pine and Strawberry will also see an increase in population over the period from 4,092 persons in 2000 to 5,473 persons in 2050.

The remainder of the population is and will continue to be scattered throughout the study area and reside in subdivisions of various sizes.

Figure 2 (A) shows the distribution of the Department of Economic Security projections for the study area.

Table 2 (A) shows the annual water demand in acre-feet for the study area between the years 2000 and 2050 for growth scenario 1 (based on 150 gallons per capita per day for resident population).

### 2.3 Growth Scenario 2

Payson's current zoning code allows for substantially more population than is shown in the Department of Economic Security projections. Two alternative land use plans are under consideration. Alternative "A" would allow the town to grow to over 85,000 persons. Alternative "B" would cap growth to a little more than 36,000 persons. This report utilizes alternative "B" growth projections to compute water demand for scenario 2 since it represents the more modest departure from the DES projections.

There are 3,400 subdivided lots in the Pine-Strawberry area. Fifty percent of these are vacant. Utilizing a factor of 2.3 persons per lot, a maximum of 7,820 persons could reside in this area.

In this scenario Payson's population would increase from 13,660 persons in the year 2000 to over 36,000 persons in the year 2050.

During the same period the Pine-Strawberry area population would increase to 7,820 persons. This would represent an increase of 2,347 persons over the Department of Economic Security projections in that time frame.

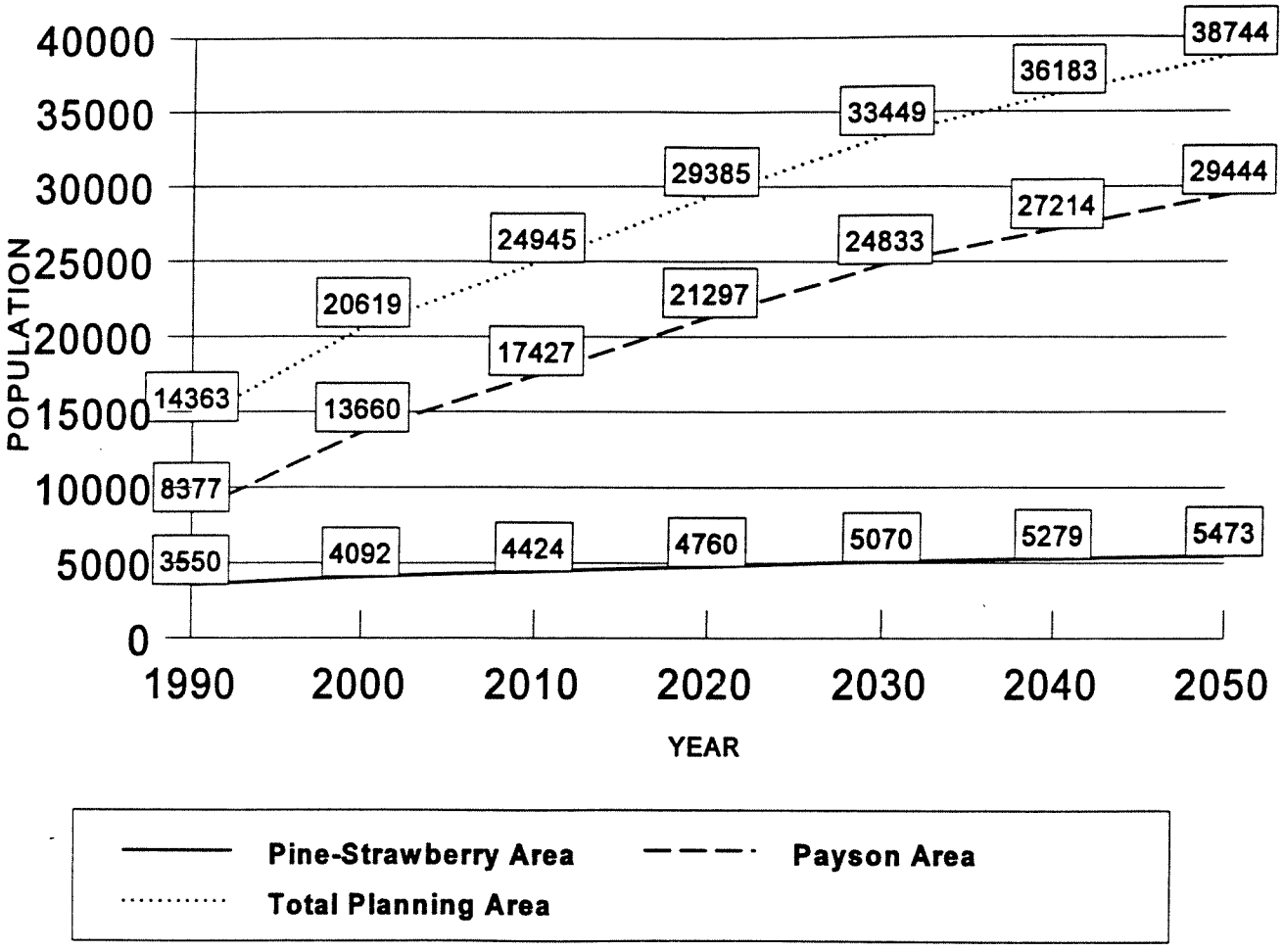
The remainder of the population would continue to be scattered throughout the study area and remain at the same level as scenario 1. Population growth for the study area under scenario 2 is shown in figure 2 (B).

Table 2 (B) shows the water demand in acre-feet for the study area between the years 2000 and 2050 for scenario 2 (Based on 150 gallons per capita per day for resident population).

By the year 2050 a firm water supply of 6,500 to 7,700 acre-feet per year will be required to sustain the projected growth in Northern Gila County.

The Payson, Pine-Strawberry area accounts for 89% of the water demand in scenario 1 and 91% in scenario 2.

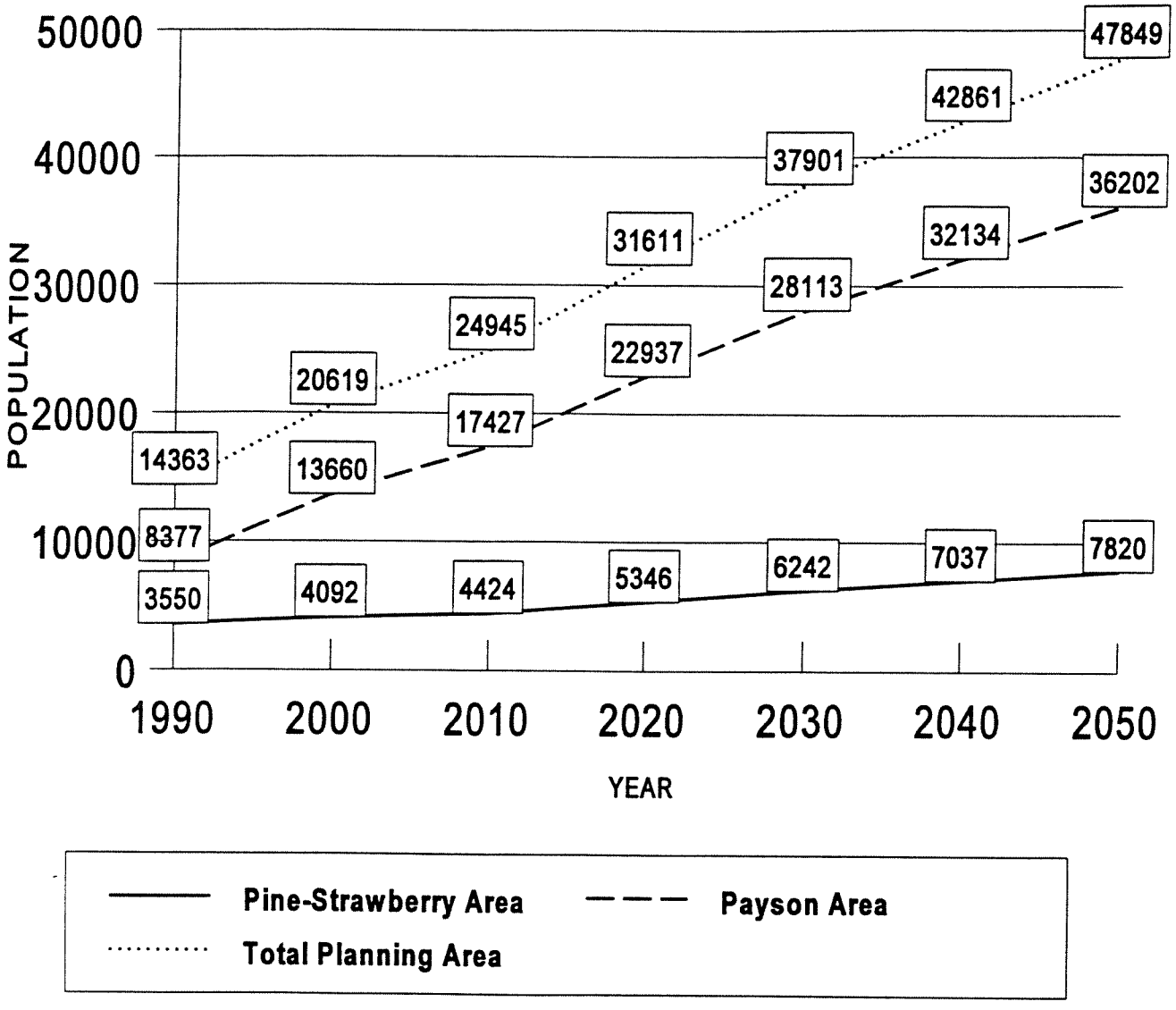
## *FIGURE 2 (A) - SCENARIO 1 POPULATION PROJECTIONS*




## *TABLE 2 (A) - Scenario 1 Water Demand (Acre-Feet)*

| AREA | 2000 | 2010 | 2020 | 2030 | 2040 | 2050 |
|---|---|---|---|---|---|---|
| *Payson* | 2,295 | 2,928 | 3,578 | 4,172 | 4,572 | 4,947 |
| *Pine-Strawberry* | 670 | 722 | 778 | 830 | 863 | 895 |
| *Other* | 499 | 538 | 581 | 618 | 643 | 667 |
| ***Totals:*** | ***3,464*** | ***4,188*** | ***4,937*** | ***5,620*** | ***6,078*** | ***6,509*** |

## *FIGURE 2 (B) - SCENARIO 2 POPULATION PROJECTIONS*




## *TABLE 2 (B) - Scenario 2 Water Demand (Acre-Feet)*

| AREA | 2000 | 2010 | 2020 | 2030 | 2040 | 2050 |
|---|---|---|---|---|---|---|
| *Payson* | 2,295 | 2,928 | 3,853 | 4,723 | 5,340 | 6,082 |
| *Pine-Strawberry* | 670 | 722 | 778 | 830 | 863 | 895 |
| *Other* | 499 | 538 | 581 | 618 | 643 | 667 |
| ***Totals:*** | ***3,464*** | ***4,188*** | ***5,212*** | ***6,171*** | ***6,846*** | ***7,644*** |

# SECTION THREE

## Surface and Ground Water Sources

# SURFACE AND GROUNDWATER SOURCES

## 3.0 PROBLEM

The communities of Payson, Pine and Strawberry in Northern Gila County (figure 1 (A)) are attractive places to live and many people are relocating there. The Arizona Department of Economic Security has developed population growth projections for these communities. Under scenario 1, the most likely estimate of population growth is approximately 35,000 persons by the year 2050 (shown in figure 2 (A)) an additional 4,000 people are expected to live in the areas surrounding these communities. Other scenarios that take all potential zoning densities into account project population growth to exceed 85,000 persons by the year 2050.

The Town of Payson secures its municipal water from numerous wells drilled into the fractured granitic rock at relatively shallow depth. Payson and much of the surrounding area is underlain by the Payson Granite, which contains water within the fractures and weathered portions, near the land surface. Current water production totals about 2,000 acre-feet per year and is produced from about 30 wells within the Town limits (figure 3 (A)). Water levels in wells are declining (figure 3 (B)) indicating that pumpage exceeds recharge. Payson does not have a 100-year water adequacy statement from the Arizona Department of Water Resources (ADWR) under the State's Groundwater Protection Act of 1980.

## 3.1 PROJECTIONS

The municipal water needed to sustain this population growth is presented in Section 2, Table 2 (A).

## 3.2 APPROACH

The sub-committee for surface and groundwater sources examined a number of possible sources for additional water. A list of the ideas produced by a round-table discussion is reproduced below:

| **Below the Rim** | **Above the Rim** |
|---|---|
| Tonto Creek Water Rights | Blue Ridge Reservoir |
| Gisela Area Water Rights | Long Valley-Clints Well Area |
| C-Aquifer (Portion below the Rim) | Hay Lake Ranch |
| Rye Creek Water Rights | |
| Indian Springs at Kohl's Ranch Water Rights | |
| Pine Creek Water Rights | |
| Fossil Springs Water Rights | **Other Options** |
| Verde Valley Water Rights | |
| Existing CAP Allocations / Trades | Better Utilization of Currently |
| Recycled and Reclaimed Water | Reclaimed Water |
| Surface Water Impoundment(s) | Stronger Conservation Measures |
| Ground Water Exploration | Development of Ordinances and |
| Horizontal Drilling (at Rim) | Building Codes to Regulate |
| Flowing Springs Water Rights | Water Usage |

The discussion of alternative sources of water can be grouped by surface water sources and ground water sources. The Town of Payson is faced with finding additional water outside the Town limits and bringing water in most probably by pipeline. Even if other wells are located within the Payson Granite, the ADWR will not grant a 100-year assured water supply for the area until another source of water is found. The sub-committee determined that a viable alternative that must be examined, despite the legal and institutional constraints, is harvesting surface flows of Tonto Creek or East Fork of the Verde River. The advantage of surface water is that it is a renewable resource being more rapidly replenished by precipitation. Minimum flows need to be maintained in the streams and water rights would need to be renegotiated. Surface water as a source for additional municipal water will require additional infrastructure costs not the least of which would be a water treatment plant and storage reservoirs.

Ground water also holds promise as a possible source. Regional ground water aquifers such as the Coconino, Redwall and Mauv Limestones are present in the sedimentary

formations of the Colorado Plateau (figure 3 (C)). The Redwall Limestone exists in the areas of the communities of Pine and Strawberry and may be 50 to 100 feet thick. The Redwall Limestone should be explored as a possible source of ground water. In the Grand Canyon area, where the formation is well exposed and well described, ground water moves downward through fractures in the overlying formations, including the Coconino Sandstone and Supai Group, and collects in the underlying Redwall Limestone. The ground water then moves laterally in solution channels within these formations and discharges as spring flow.

North of the Mogollon Rim (figure 1 (A)), thick sequences of these regional aquifers exist. Whether the formations are saturated or not is unknown and whether the aquifers are permeable enough in these areas to yield sufficient quantities of water to wells. To develop any our of Town limits source for Payson will require a pipeline. A pipeline to the Plateau could deliver water from the Blue Ridge Reservoir (treated or untreated) or ground water from wells, although mixing potable and non-potable water in the same pipeline is less than desirable.

The advantage of ground water, as a source of municipal water, is that primary filtration is not required therefore the expense of a water treatment plant is spared. In addition, storage reservoirs are not required either because the aquifer can provide the storage required.

## 3.3 INFORMATION NEEDS

More information is needed to make informed decisions that will lead to the most cost-effective solution to acquire additional water supplies – especially before infrastructure expenditures are made. They are:

### 3.3.1 The Geohydrologic Setting of Pine-Strawberry

Few wells greater than 350 feet in depth exist in this area. If the Redwall Limestone were saturated below these communities, the drilling depths to secure a stable source of water would be less than 2000 feet.

### 3.3.2 Regional Acquifer Characteristics on the Colorado Plateau

The regional acquifer characteristics on the Colorado Plateau near the Mogollon Rim are needed. This could be a stable source of water for the area if well yields and aquifer storage are sufficient for sustained pumping.

### 3.3.3 Infrastructure Costs

The infrastructure costs associated with pipeline construction, operation and maintenance; costs associated with storage reservoirs and water treatment plant construction, operation and maintenance.

### 3.3.4 Feasibility Studies of Surface Flows

The feasibility of harvesting higher surface water flows from the Tonto Creek and/or East Fork of the Verde River will need to be determined.

## 3.4 RECOMMENDATIONS

The sub-committee discussed these and other alternatives. A recommended course of action follows:

### 3.4.1 Inventory of Possible Sources

A rationale must be developed for the inventory of possible sources (listed in section 3.2) either excluding them from consideration or recommending them for further development. Additional source opportunities may also be identified during this process.

### 3.4.2 Legal and Institutional Constraints

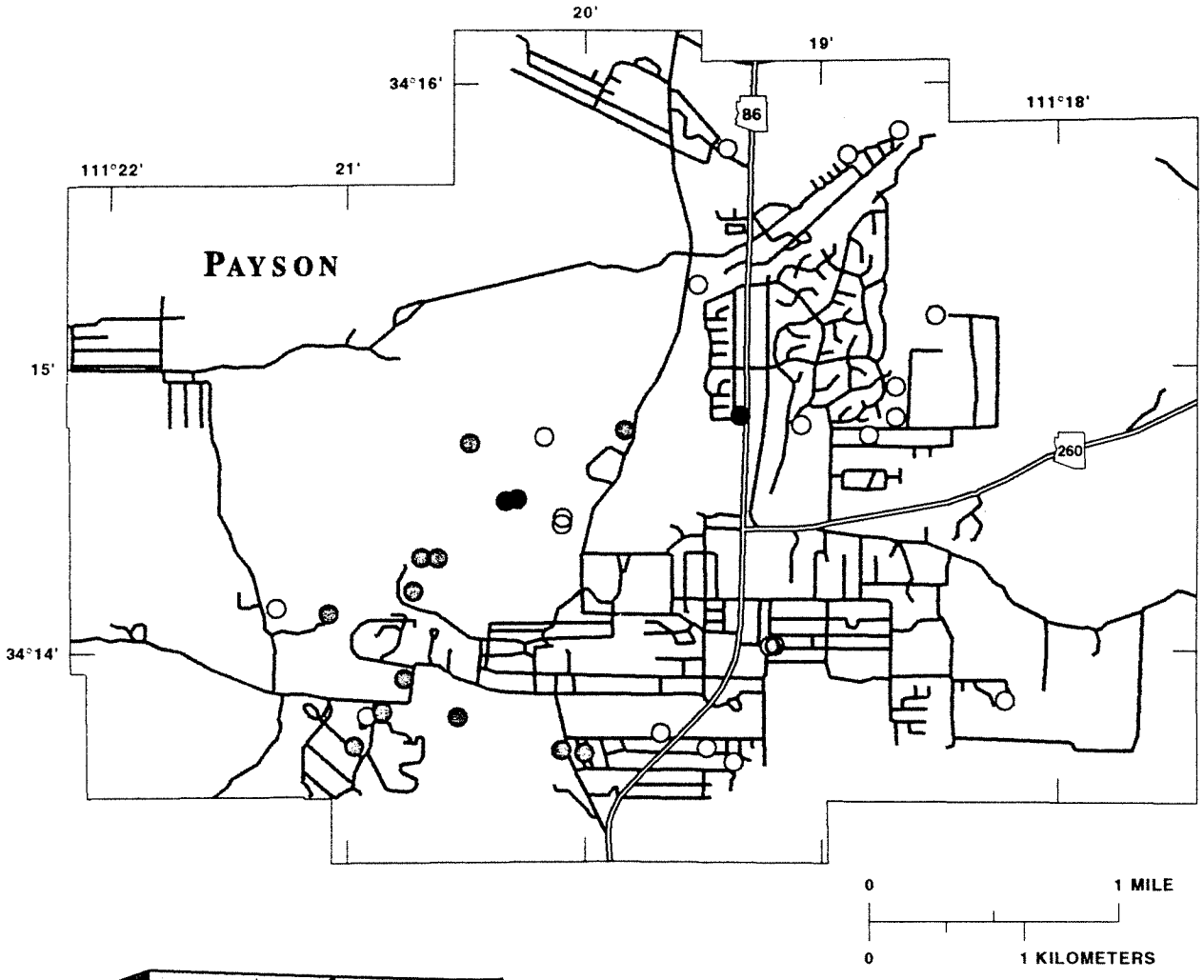
The resource, legal and institutional constraints that limit the development of surface water from Tonto Creek and/or East Fork of the Verde River must be determined.

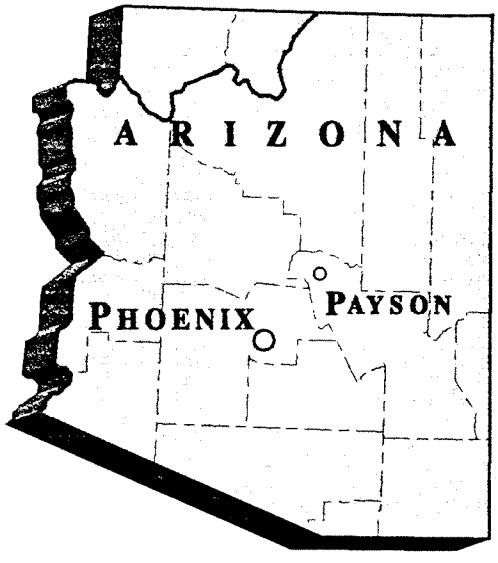
### 3.4.3 Redwall Limestone Investigation

The condition of saturation of the Redwall Limestone beneath the Pine-Strawberry area should be determined. This will involve drilling a test hole.

### 3.4.4 Political and Financial Considerations

Recommendations to the Community Officials, County Board of Supervisors, and the State of Arizona that promising areas for securing additional water are available and that financial resources should be identified to begin filling is some of the above noted information needs.




**EXPLANATION**

PUBLIC WATER-SUPPLY WELLS

- ○ Maximum pumping rate 0–99 gallons per minute
- ◐ Maximum pumping rate 100–300 gallons per minute
- ● Maximum pumping rate greater than 500 gallons per minute

**Figure 3A** Location of municipal water-supply wells within the Town of Payson, Arizona.

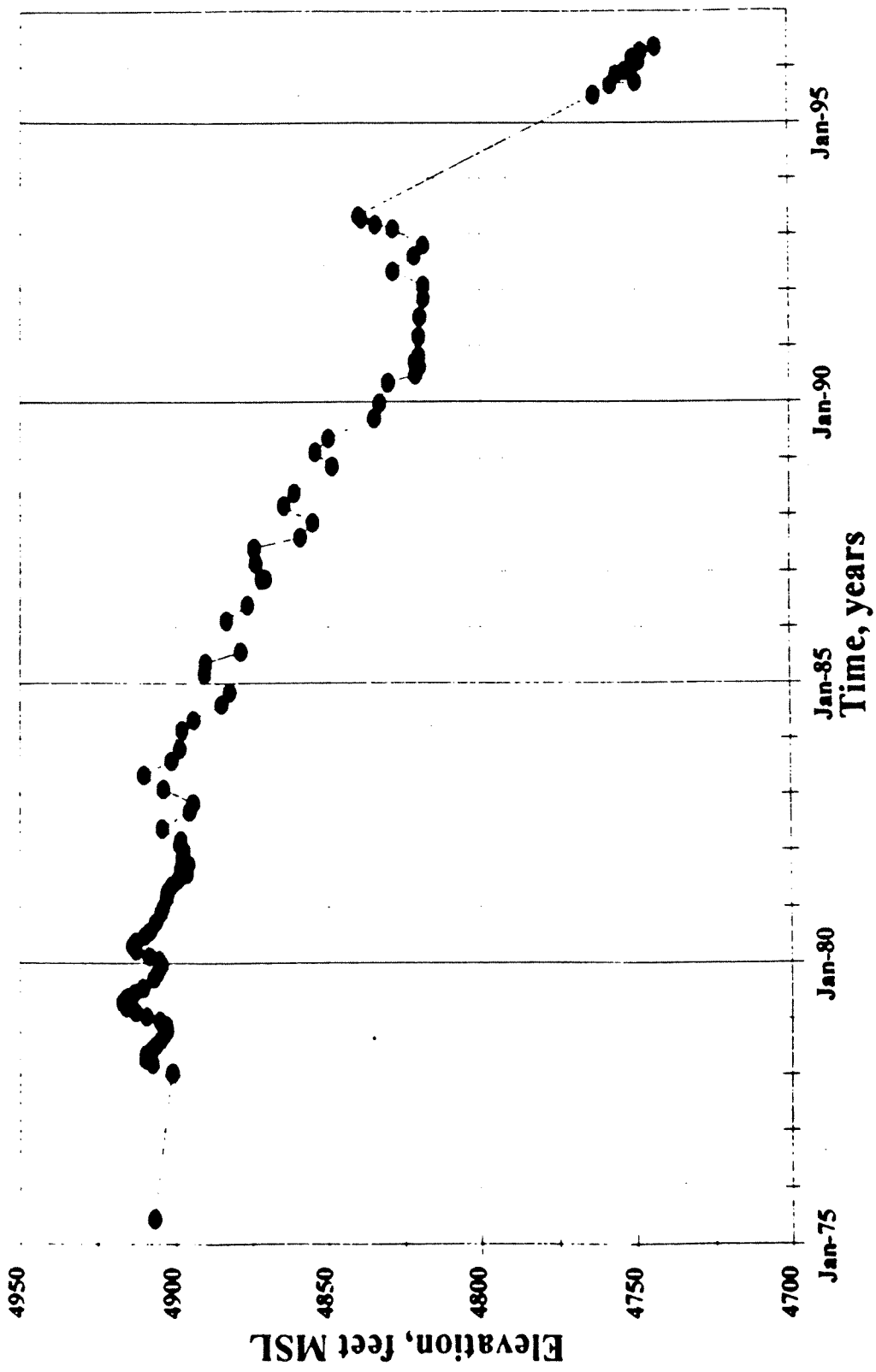



FIGURE 3(b)
Water Levels in Payson Well PE-10/W-24

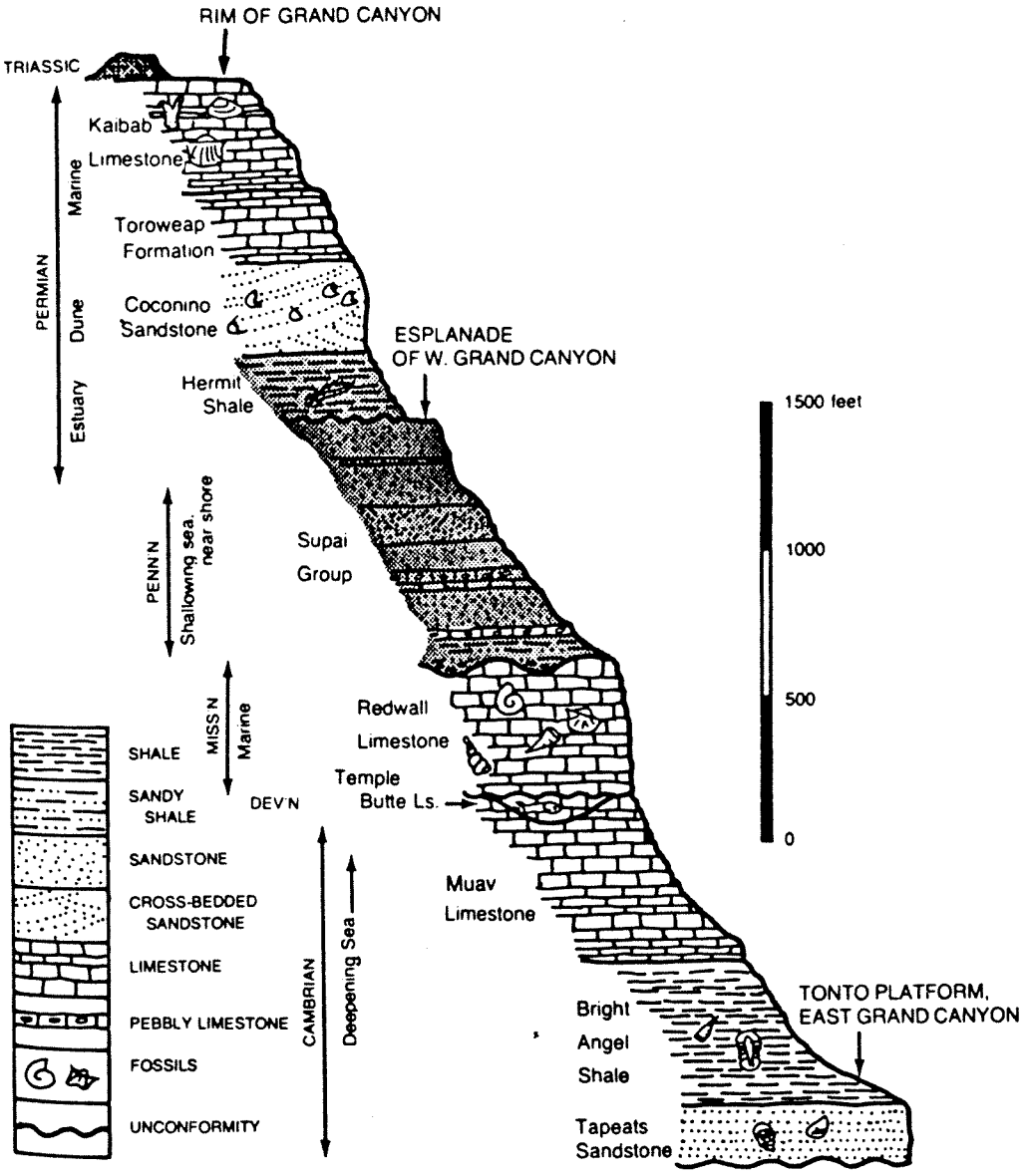



FIGURE 3(C)

Stratigraphic section of Paleozoic formations of the Colorado Plateau. Mauv Limestone, Bright Angel Shale and the Tapeats Sandstone may be absent in the Pine—Strawberry area.

# SECTION FOUR

## Environment and Conservation Considerations

# ENVIRONMENT AND CONSERVATION CONSIDERATIONS

## 4.0 ENVIRONMENTAL AND CONSERVATION ISSUES IN CONTEXT

Ultimately, the selection of options to provide a firm water supply for communities in the study area will rest with three factors:1) physical availability of additional water, 2) legal right to use it, and 3) cost. These factors are not independent. Physical and legal availability can depend on how much you are willing to pay. Additional factors can be defined, such as public acceptance and regulatory constraints. The purpose of this chapter is to consider public acceptance, regulatory, environmental and conservation factors as components of cost, rather than as independent factors. While assigning dollar values to these factors is often difficult and not always practical, this approach can guide the analysis and selection of options by highlighting alternatives with either unacceptably high or especially attractive "costs". Rather than leading the identification of options, this look at environmental and conservation issues will follow that identification to give the assessment of them more depth.

### 4.0.1 Constraints and Opportunities

Constraints make a particular option less attractive, more costly, controversial, risky, or otherwise "more expensive". Examples are public acceptance or regulatory obstacles to using reclaimed effluent, reduced stream flows from surface diversions, or reduced spring/base flows from ground water pumping. More mundane matters include the cost in time and money to obtain an effluent reuse permit from ADEQ or to amend the regional waste management plan (Clean Water Act – Section 208 Plan). Opportunities make a particular option more attractive, less costly, less controversial, less risky, or otherwise "less expensive". These can include providing a readily available source of water or by having multiple benefits, which allow cost sharing among more beneficiaries.

### 4.0.2 Related Issues

Related issues are those incidental to the selection of an option (such as treatment plant siting or pipeline right-of-way acquisition and construction), related to growth and development itself (such as erosion and sedimentation from construction), and financing or infrastructure issues related to physically transporting, treating, and delivering water or wastewater, including reclamation or disposal.

## 4.1 EXISTING SUPPLIES

Existing supplies are a significant portion of the total water needed for the area. Several factors can threaten (constrain) those supplies, which means greater costs for replacement or advanced treatment. Alternatively, various options are available to decrease the risk (opportunity) to ensure the future availability of those supplies.

### 4.1.1 Threats to Existing Supplies

Several wells in central Payson are contaminated by a release of perchloroethylene (PCE), a common dry cleaning solvent. Through current activities at the Payson PCE WQARF (Water Quality Assurance Revolving Fund – i.e. State Superfund) Site seek to stop the further spread of contamination, it will be difficult to completely eliminate the PCE from the aquifer. This serves as an example of the vulnerability of existing water supplies, particularly in the face of ongoing growth and urbanization. Population growth (residential, seasonal, and recreational) spurs demand for commercial development, which combined with residential growth, increases the potential threats to ground water supplies.

Septic tanks are common for wastewater disposal in rural areas. Under the proper soil/geological conditions their use is appropriate. Where conditions are unsuitable or where development density exceeds the natural loading capacity, septic tanks can be a major source of nitrate and microbial contamination. As seen at the Payson PCE site, use of septic tanks for commercial developments increases the risk of releasing industrial chemicals to ground water. It is

politically and financially difficult for local governments to require existing septic tank owners to hook up to a municipal waste water system or to install sewer lines for new construction before the density really requires it. Development pressures on local governments can lead to approval of septic systems where their use is inappropriate.

### 4.1.2 Protection/Opportunities

While the Payson PCE Site exemplifies "threats" to existing supplies, the treated water can be utilized as part of the area's water supply. Public acceptance of this water for drinking water will depend on perception and providing consumers the appropriate information and the ability to be a part of the decision on its use.

The potential risks due to development do not mean that growth should be halted. It does mean that safeguards should be implemented to manage the risk. Tools available to protect these supplies include the Well Head Protection program, whereby ADEQ and EPA can provide guidance and support for local communities that voluntarily adopt the approach. The Source Water Assessment program (per the 1996 Safe Drinking Water Act Amendments) will entail the delineation of areas where public water supplies are obtained, conducting an inventory of potential contaminant sources, and assessing the relative risk from these potential contaminants. The results of this assessment will provide communities with information on which to base local source water protection efforts. Zoning and land use planning are the prerogative of county and municipal governments. Communities can steer certain activities away from water supply areas or to require closer scrutiny it they are located near water sources. Other tools are increased inspections and enforcement of environmental laws and pollution prevention and technical assistance programs to ensure sound practices at high-risk sites.

## 4.2 NEW SUPPLIES

Moving water from a source to the communities may in itself cause negative impacts. These should be considered early on in the study process. On the other hand, there are several opportunities for increasing the existing supply with non-traditional means, which do not involve transporting water from a distance.

### 4.2.1 Riparian Impacts / Spring Flows

Surface flow diversions, which reduce in-stream flows, can negatively impact riparian habitat and impinge on downstream water rights. Increased groundwater pumping can reduce spring / base flows with the same effect. If water is drawn from federal lands or if a federal permit is required, provisions of the National Environmental Policy Act (NEPA) may be triggered leading to an Environmental Assessment (EA) or Environmental Impact Statement (EIS). The presence of threatened or endangered species would trigger provisions of the Endangered Species Act. Preparing an EA, EIS or a Habitat Conservation Plan for Threatened or Endangered Species has cost implications of its own. Potential impacts to threatened or endangered species can bring the added constraint (and expense) of lawsuits to halt implementation of a particular option. Groundwater pumping that affects water flowing in caves found in the area could trigger application of the Federal Cave Conservation and Protection Act.

### 4.2.2 Impacts of Wastewater Disposal / Reclamation

Increased water use also means an increase in the volume of wastewater generated. Treatment and disposal or reclamation and reuse have cost implications, depending on the volume and level of treatment required. Disposal of treatment sludge is an additional constraint, both for protection of ground and surface waters and on the total cost of treatment and disposal or reuse. Continued use of individual septic tanks and/or decentralized wastewater treatment and disposal precludes greater utilization of reclaimed effluent. Their use may have negative water quality impacts of their own by creating additional septic tank

loading, new effluent-dominated streams, or increasing the flow in existing effluent-dominated streams.

### 4.2.3 Protection Opportunities

Protecting new supplies from risks will be critical to maintaining them. Bringing water supplies in from distant areas will expand the scope of efforts to prevent contamination of those supplies. If new supplies include surface waters, Best Management Practices for Non-Point Sources of pollution such as urban runoff, grazing and agriculture, wildlife management, and recreational activities will decrease the risk of contaminating new water sources.

### 4.2.4 Non-Traditional Water Supplies

Water conservation measures can stretch existing supplies. These can include the use of low volume shower heads, faucets and toilets, minimizing or eliminating high water demand landscaping, or penalizing excessive water use through pricing mechanisms. Recent water shortages in the Northern Gila County area have forced conservation practices already. Thus incremental benefits offered by conservation may be limited. Experience in the region has shown that people tend to increase their water use if they perceive the crisis has lifted. A diligent effort to keep the pressure on for conservation, particularly for new growth, will help maximize the benefit of conservation mechanisms.

Reclaimed wastewater effluent does not have to be brought in from somewhere else. Clustered development, whereby higher density is balanced by greater open space, has the advantage of minimizing the expense for sewer and water infrastructure systems (This may have side benefits in the area of fire safety, but may conflict with developers' traditional marketing strategies). This approach can work to support centralized sewers, rather than individual septic tanks, to deliver more wastewater to a central plant for reclamation and reuse. Reclaimed effluent can be used in-stream to make up for surface water diversions or groundwater pumping, as a substitute for "pristine" water for non-potable uses or

to exchange for downstream water-rights. Where low development densities makes central sewer systems prohibitively expensive; gray water systems, which utilize wastewater from bathtubs, lavatory sinks, and possibly laundry appliances, can be used for domestic landscape irrigation. Local water conservation ordinances may be used to require stubbing out gray-water connections on new construction. Hotels and resorts can be constructed to allow reuse of gray water from showers and lavatory sinks. Low-pressure sewer systems utilizing individual grinder-pumps at each service connection can reduce the cost of sewering rolling terrain

## 4.3 RELATED ISSUES

Several items, not directly related to obtaining new water supplies, warrant consideration. These include indirect environmental impacts related to growth and urbanization, costs and other impacts related to the construction and operation of new water and wastewater infrastructure, utilization of reclaimed water, permitting, regulatory requirements, and integrated infrastructure, environmental, community, and financial planning.

### 4.3.1 Road Building, Construction, and Urban Runoff

Road building can increase erosion and sedimentation and degrade surface water quality. Construction sites can be major sources of sediment due to erosion of bare soil or of other pollutants from improper use or disposal of fuels, lubricating oils, and construction chemicals. Poor design and construction practices can result in both short and long-term impacts that can, in turn, aggravate other impacts from water transfers and development.

As the Northern Gila County communities develop toward build-out, more and more land will be paved and roofed. This increases runoff from impervious surfaces and reduces infiltration and recharge. Urbanization tends to degrade the quality of water that runs off into streams or recharges into the aquifer. The affected communities may want to adopt development standards that incorporate urban runoff controls before much more construction takes place. Retrofit is

often more difficult and expensive than building such things in at the start, particularly as land values increase.

### 4.3.2 Water Infrastructure

This section touches on practical items associated with the establishment of infrastructure needed for transmission, treatment and delivery of new water supplies; wastewater collection, treatment, reclamation or disposal; and permitting, approval, and financing of infrastructure. Issues to consider under the category of water transmission include right-of-way acquisition and the environmental impacts of construction and maintenance. Siting and operation of water treatment facilities have implications for property acquisition, construction techniques, disposal of filter backwash, and chemical storage and handling. If new water supplies include surface waters, filtration will be necessary. Changing drinking water regulations may someday require additional treatment for ground water.

An important facet of water system operation is managing peak demand. Additional storage capacity will be needed, with resulting implications for siting, pressure zones, and integration within the distribution network. Greater demand may require increasing the size of distribution mains and the addition of booster pump stations, or of pumps to deliver water to storage facilities. Sound planning and engineering will facilitate an orderly and phased development of the system, rather than ad hoc fixes when system operation becomes strained with growth.

### 4.3.3 Wastewater Collection & Treatment

Increasing flows to central sewers may overtax existing pipe capacities and require construction of larger sewer lines. Decisions on septic tank use may be driven by community recognition of the value of wastewater as a resource or by regulatory pressure if ground water quality is degraded by septic systems use.

### 4.3.4 Wastewater Reclamation & Utilization

Centralized reclamation facilities will have their own environmental impacts due to siting considerations. Providing storage capacity may be an important consideration to accommodate the seasonal imbalance between demand for reclaimed water and its production. Conversely, there are costs associated with the level of treatment required for wastewater reclamation and the cost of distribution systems if the point-of-use is not adjacent to the treatment plant. Land, construction, and maintenance costs for a reclaimed water system may be more expensive and less reliable than finding adequate "pristine" supplies. In this case, wastewater treatment and disposal in ways that increase stream flows to support riparian habitat may be more cost-effective.

### 4.3.5 Environmental Permitting

Both drinking water and wastewater facilities need engineering review, "approval to construct," and "approval of construction" by ADEQ or delegated county authorities. Wastewater treatment, if it results in a surface water discharge, requires a National Pollutant Discharge Elimination System (NPDES) permit from the USEPA. It also requires an Aquifer Protection Permit issued by ADEQ, along with Clean Water Act (CWA) Section 401 State Water Quality Certification for compliance with state water quality standards. Other permits may include CWA Section 404 permits from EPA or the US Army Corps of Engineers for construction activities within "Waters of the United States." This may impact surface water diversions or construction of transmission lines. Endangered species considerations may require consultation with the U.S. Fish & Wildlife Service or development of Habitat Conservation Plans.

### 4.3.6 Integrated Planning & Finance

The water supply issues facing the communities of Payson, Pine, and Strawberry are not isolated ones. They are intertwined with broader issues of public health, quality of life, community planning, a sustainable economy, and not letting the

attractiveness of the area result in the loss of its natural beauty and rural life style. Taking a comprehensive look at the complex interaction of interests and needs is considerably more difficult than a narrow look at one or two issues. The benefits of undertaking such an approach lie in forging consensus among those who would be affected by short and long-range policy decisions. By successfully meeting the needs of a broad range of people, lawsuits and recall elections can give way to implementation of well-considered visions of the region's future.

Consideration of broader issues, enables sound planning to finance the capital and operational costs of providing clean water and maintaining the natural environment. The Water Infrastructure Finance Authority, the Rural Infrastructure Council, the USDA and other public and private sources of financing should be integrated with planning and design efforts.

# SECTION FIVE

## Potential Funding Sources

# POTENTIAL FUNDING SOURCES

## 5.0 Funding Issues

In dealing with the issue of a firm water supply for Northern Gila County the question of funding such an effort looms large. Funding will be needed to supplement in-house staff time, or where no staff is available, to conduct the entire process.

The major areas of funding concerns include:

- Developing a Comprehensive Water Plan for Northern Gila County
- Research & Exploration to Identify and Secure the Water
- Construction of the Necessary Infrastructure to Capture, Store and Deliver the Water to the Residents

## 5.1 Funding Sources

The Funding Sources Sub-Committee has developed a list of Agencies and Programs which have been identified as potential funding sources, however, due to time and manpower constraints this list is not to be considered "all inclusive".

### 5.1.1 United States Geological Survey (USGS) Federal-State Cooperative Water- Resources Program.

The USGS provides maps, reports, and information to help others meet their needs to manage, develop and protect America's Water, Energy, Mineral, and Land Resources.

### 5.1.2 United States Environmental Protection Agency (EPA) Federal Funding Sources for Small Community Wastewater and Water Systems – November 1997

This publication highlights ten federal programs that help state, tribal and local officials identify possible funding sources, whom to contact, and how to apply. Although this publication describes some drinking water programs, it focuses mainly on wastewater.

### 5.1.3 United States Department of Agriculture (USDA) Rural Utilities Services (RUS) Water and Waste Disposal Loan and Grant Programs

The rural Utilities Service (RUS) administers water and wastewater loan and grant programs to improve the quality of life and promote economic development in rural America. RUS is coordinating the Water 2000 initiative, which has as its goal to provide clean, safe and affordable drinking water to all rural homes by the year 2000. This program has recently been streamlined.

### 5.1.4 USDA Rural Business-Cooperative Service (RBCS) Business and Industry Guaranteed Loan Program

The primary purpose of this program is to create and maintain employment and improve the economic and environmental climate in rural communities.

### 5.1.5 United States Department of Housing and Urban Development (HUD)

HUD makes block grants available to states under the Community Development Block Grant Program for smaller communities. CDBG funds can be used for water and wastewater projects, individual hook-ups, planning, and technical assistance, as long as these activities meet a national objective – usually benefiting low to moderate income people.

### 5.1.6 Drinking Water State Revolving Fund (DWSRF)

The Drinking Water State Revolving Fund was created by the Safe Drinking Water Act Amendments of 1996 to help water utilities finance costs of complying with SDWA requirements and protecting public health.

### 5.1.7 United States Department of the Interior – Bureau of Reclamation

The Reclamation Act of 1902, The Small Reclamation Project Act of 1956, The Colorado River Basin Project Act, the Water Reclamation and Groundwater Study and Facilities Act, and General Departmental Policy provide for Federal Project Planning and Development Assistance. Opportunities exist for

assistance in Planning, Studies, and Project financing. Loans with up to 40-year repayment periods and Grants are also available.

## 5.2 Additional Information

In addition to the above referenced sources, the Central Arizona Association of Governments hosts a Rural Infrastructure Committee meeting twice a year. These meetings are designed to bring together funding sources and projects for local communities.

The meetings for this year are scheduled for Wednesday, March 18, 1998 and Wednesday, October 21, 1998.

## 5.3 Restrictions

Many of the agencies and programs, noted above, have been established to address specific water or wastewater needs. Because each agency or program has specific guidelines and regulations restricting the use of the funding it is difficult to determine applicability with out specific projects in mind.

# APPENDIX A

## Existing Water Information Documents
## (Bibliographic Listing)

## EXISTING WATER INFORMATION DOCUMENTS

Compiled for NGCWP Technical Committee Report - February 23, 1998

| Document | Description | Author / Date |
|---|---|---|
| A Framework for the Analysis of Surface Water Quality in the Tonto National Forest | A resource and study methodology inventory framework for the efficient analysis of surface water quality within the Tonto National Forest. | Eric L. Swanson & Charles E. Downs - Center for Research, College of Engineering and Applied Sciences, ASU, (1/78) |
| Anticipated Changes in the Flow Regimen Caused by the Addition of Water to the East Verde River, Arizona | Water Resources Report (See Title). | H.W. Hjalmarson and E.S. Davidson, U.S. Department of the Interior, Geological Survey, (11/96) |
| Areawide Water Quality Management Plan, Interim Report | CAAG 208 Interim report for FY 1980. A progress report on the continuing planning process recommended in the CAAG 208 Areawide Water Quality Management Plan. | John A. Blackburn, Lester A. Snow, Central Arizona Association of Governments, (CAAG) (1980) |
| Arizona Department of Water Resources Population Projections (1997-2050) for use in Statewide Water Planning | Statewide population projections | Compilation of County Projections (9/97) |
| Arizona 208 Program Integrated Work | Program for State of Arizona - Northern Arizona Council of Governments, District IV Council of Governments, Central Arizona Association of Governments and Southeastern Arizona Governments | (12/78) |

| Document | Description | Author / Date |
|---|---|---|
| Basic Data for Selected Wells and Springs in the Pine-Payson-Kohl's Ranch Area, Gila County, Arizona | Data for selected wells in the identified areas | U.S. Geological Survey (8/77) |
| Central Arizona Project Feasibility Study for the Town of Payson, Arizona | Feasibility Study | W.S. Gookin & Associates and Dashney & Associates (8/84) |
| Eastern Arizona Counties Foundations for Comprehensive Land Use Planning | Land Use Planning Reference developed for Apache, Gila, Graham, Greenlee and Navajo Counties | Department of Geography and Public Planning, NAU, (3/95) |
| Eastern Arizona Counties Region - Interim Report | Land Uses, Economics, and Population Statistics. | Dr. Alexander J. Thai, S.W. Center for Resource Analysis, Western New Mexico University, Silver City, New Mexico (5/94) |
| Factbook Public Forums November - December 1980 | This study identifies a preferred plan to reduce flood damages along the Salt and Gila Rivers and provide regulatory storage of water for the Central Arizona area. | Central Arizona Water Control Study (1980) |
| Field Reconnaissance Report | Assessment of potential developing of a flood protection and prevention project to alleviate their flood problems. | U.S. Department of Agriculture, Soil Conservation (2/79) |
| Fish and Wildlife Coordination Act Substantiating Report | Substantiating report for Central Arizona Project, Verde and East Verde Water Diversion | U.S. Fish and Wildlife Service Phoenix Ecological Services Field Office (12/89) |

| Document | Description | Author / Date |
|---|---|---|
| Ground Water Resources Investigation | Calhoun Ranch, Mayfield Canyon - Gila County, AZ | Southwest Ground Water Consultants, Phoenix, Arizona (7/95) |
| Hydrologeologic Investigations to Identify and Evaluate Potential Groundwater Development Areas in the Vicinity of the Town of Payson | Hydrologeologic Investigation Report | Errol L. Montgomery & Assoc., Inc., Tucson, Arizona (6/93) |
| Impact of Recreation on Water Quality of the East Verde River | Final Report to CAAG for Impact of Recreation on Water Quality of the East Verde River | Milton R. Sommerfield, Patric F. Athey & Bradley C. Mueller Department of Botany and Microbiology, ASU, (10/79) |
| Impact of Second-Home Development on Water Availability in North Central AZ | Initiated in order to gather more information on Arizona second homes, second home water consumption and second home waste water. | M.E. Bond and Robert H. Dunidoski (4/77) |
| Mayfield Canyon Water Budget at Mayfield Canyon Ranch | Prepared for Chaparral Holding, Inc. in preparation for the Chaparral Pines Development. | ASL Sierra Consulting Engineers, Payson, AZ (10/95) |
| Town Forum for a Community Briefing on Water Supply | Payson Town Forum Project - Community Education Process | Town of Payson, ADEQ and Arizona Department of Water Resources |

| Document | Description | Author / Date |
|---|---|---|
| Water Quality Assessment Report for the State of Arizona, Water Years 1978 & 79 | Water Quality Assessment Report, Volume One | Ambient Water Quality Unit, Bureau of Water Quality Control Division of Environmental Health Services, Arizona Department of Health Services (1978) |
| Water Resources Data for Arizona Water Year 1977 | Water Resources Data | District Chief, Water Resources Division, U.S. Geological Survey Tucson, AZ (1977) |

## EXISTING WATER INFORMATION DOCUMENTS

In Possession of the Pine/Strawberry Water Improvement District

| Document | Description | Author / Date |
|---|---|---|
| Active Regulated Water Systems in Arizona | Quick Look List | ADEQ, ADWR and CTEU |
| Arizona Water Banking Authority - Annual Report | Authority Summary | Arizona Water Banking Authority (1996) |
| Color Aerials of the Pine and Strawberry Areas | On Loan from the Payson Ranger District | (6/96) |
| Geologic Map of Pine, Arizona | 715' Quadrangle, Coconino and Gila Counties, Arizona | USGS (1990) |
| Geologic Map of the Fossil Creek Roadless Area | Map #MF-1568C, Yavapai, Gila and Coconino Counties, Arizona | USGS (1984) |
| Hydrology and Geology Studies of the Pine Area | Prepared for Myers Development Company | Paul Meneara, Hydrologist |
| List of Publications | Available Document Catalog | USGS (7/93) |
| Masters Thesis and Map of the Pine Quadrangle | | Melanie Weisman and Gordon Weir, NAU, (1984) |

| Document | Description | Author / Date |
|---|---|---|
| Miscellaneous Geology in the Pine and Strawberry Areas | Various Documents, etc. | Sources and Authors Unknown |
| Final Notice of Policy - ADWR | Regarding Transfers of Central Arizona Project Municipal and Industrial Water Sub-contracts | ADWR (8/96) |
| Payson Ranger District - Precipitation Data 1931 through 1996 | Precipitation Reports | USFS - Payson Ranger District (1997) |
| Pine Area Precipitation Data 1996 - 4th Quarter | Precipitation Reports | Pine Fire Station Records (1996) 4th Quarter |
| Pine/Strawberry Community Profile | Community Description and Statistical Information | Arizona Department of Commerce (6/96) |
| Springs Along the Mogollon Rim in Arizona | Spring Information Studies | J.H. Feth and J.D. Hem, USGS |
| Verde Cooperative River Basin Study | Summary Report, Computer Software for Viewing Maps and Databases | (9/96) |
| Water District Formation Attempts | Information and Records from earlier attempts to for a Water District in the Pine/Strawberry Areas | Various Dates Involved |
| Well List for Pine and Strawberry | Current Listing of Wells in the Pine/Strawberry Area | Current |

# APPENDIX B

## NGCWP Steering Committee Meeting Minutes
## (October 30, 1997)

# MINUTES

**Northern Gila County Water Plan**
**Steering Committee Meeting**

**Attending:**

| | | |
|---|---|---|
| Ron Christensen | Gila County | *Steering Committee Chair* |
| Robert Mawson | Gila County | *Technical Committee Chair* |
| Mike Jensen | HIS / Tonto Apache Tribe | |
| Maxine Leather | CAAG | |
| Bob Hardcastle | Brooke Utility | |
| Vern Stiffler | Town of Payson | |
| Dino DeSimone | USDA-NRCS | |
| Jim Cooper | SRP | |
| Greg Kornrumph | SRP | |
| Howard Matthews | Pine / Strawberry Improvement District | |
| Jerry Rathke | ADWR | |

**Summary of Discussion:**

Participants were introduced and it was recognized that representatives from the US Forest Service and Coconino County were unable to attend this meeting, however, they would be future participants in the process. Cliff Potts from the Payson Economic Development Corporation was also unable to attend this meeting.

The NGCWP Steering Committee was formed to represent the public and major water interests in the Northern Gila County Area. The major functions of the Steering Committee will be to provide direction & oversight for the process (including time frames), cultivate public participation and ultimately to seek funding for the water plan and resulting recommendations for implementation.

The Goal of the NGCWP group is to develop a firm water supply to meet the projected growth in Northern Gila County utilizing short, intermediate and long-term plans.

In summary, four main objectives were discussed:

1. Identify new surface water and ground water sources.
2. Match the new sources with the regions demand centers.
3. Identify the costs to deliver the new sources to the demand centers.
4. Identify environmental and institutional constraints.

Advantages of organizing this group will be:

1. Wide range of agencies are represented.
2. Knowledgeable individuals are involved.
3. Consolidation of existing data and experience from many sources.
4. Greater success in approaching funding sources.

A Technical Committee will be necessary to collect and study existing data and to formulate a Scope of Work to accomplish a Comprehensive Water Study for Northern Gila County.

The following Technical Committee structure was recommended, discussed and approved:

| | |
|---|---|
| Technical Committee: | Robert Mawson, Chair<br>Gila County |
| Sub-Committees: | |
| 1. Surface and Ground Water Sources | Mark Anderson, Chair<br>USGS |
| 2. Water Demand Identification | Dennis Sundie, Chair<br>ADWR |
| 3. Funding Sources | Reed Peterson, Chair<br>Rural Development |
| 4. Environmental and Conservation | John Hathaway, Chair<br>ADEQ |

It was also understood that additional Sub-Committees may be formed if necessary.

Approximately 30 individuals have expressed and interest in serving in the Technical Committee and will be assigned to work in one or more of the sub-committees. These assignments will be made at the first Technical Committee Meeting.

The initial responsibilities of the Technical Committee are as follows:

1. Firm up the Study Area boundaries, which have been preliminarily established as the Gila County boundary to the West, North and East and the Payson Ranger District boundary to the South.

2. Collect and compile all applicable existing data pertaining to the identified study area.

3. Develop a Scope of Work for a Comprehensive Water Study for Northern Gila County as encompassed in the study area boundaries.

4. By the first of the year, bring a report (consisting of the items 1, 2 and 3) which can be presented to the Steering Committee for discussion and possible action in January 1998.

It is hoped that this first phase of information will enable members of the Steering Committee to approach the Legislature and other possible funding sources.

CAAG also hosts a Rural Infrastructure meeting twice yearly. Maxine Leather will forward the dates to the group and help schedule a presentation.